

Name \_\_\_\_\_

Math 1  
Exam 2

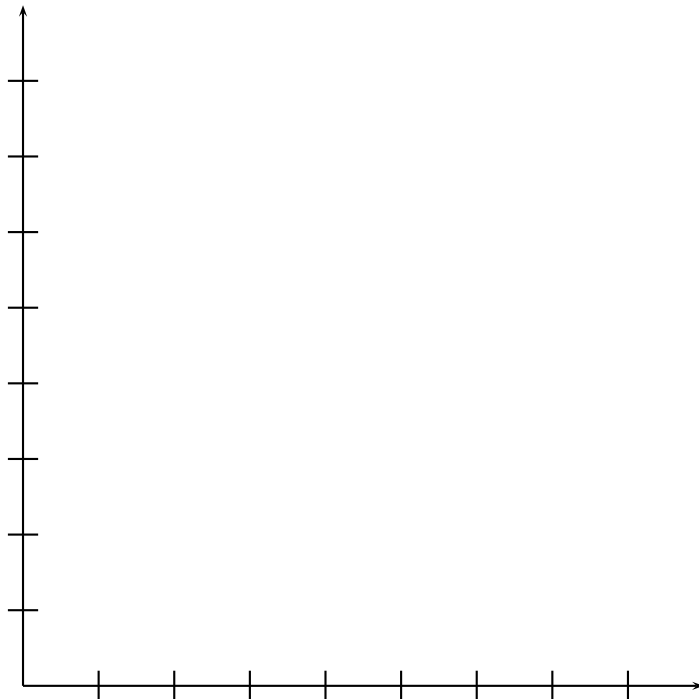
For all problems, show all work. You may use a graphing calculator. Do not round unless instructed otherwise. Good luck! ☺

For the first two problems, use the following information:

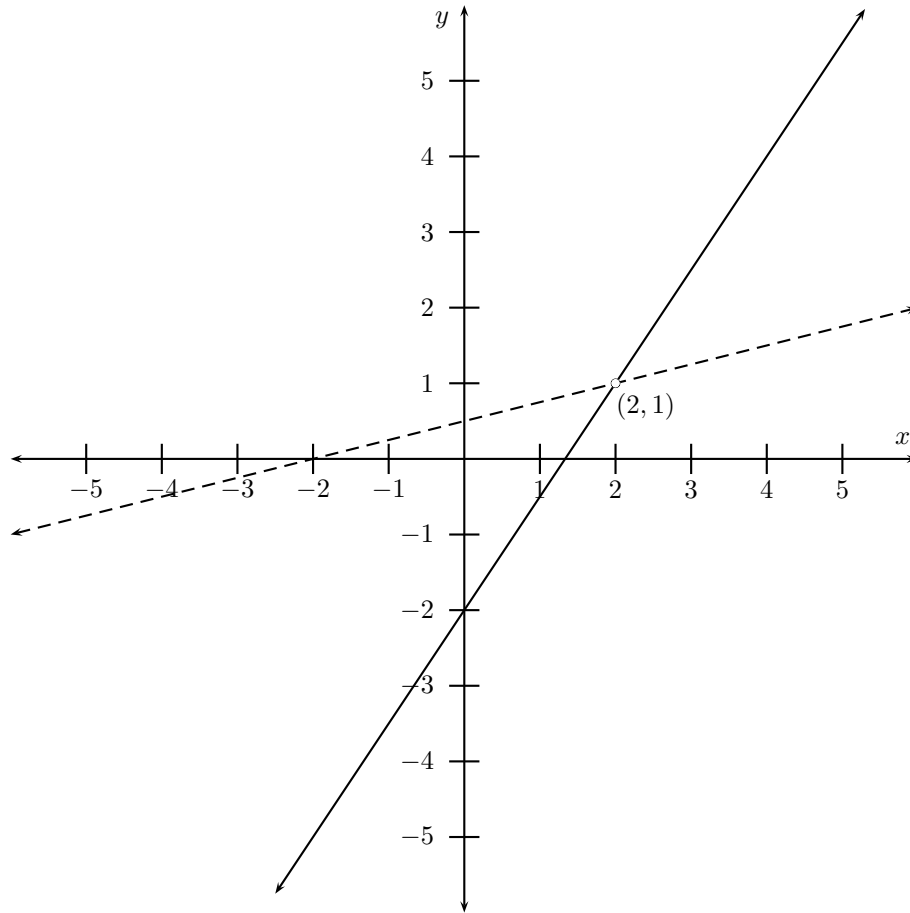
Tabitha earns money by babysitting and tutoring. She earns \$8 an hour for babysitting, and she earns \$15 an hour for tutoring. Tabitha wants to earn at least \$150. Tabitha can work for at most 16 hours.

1. (1A, 1B, 1D) State a system of inequalities that matches the given scenario. Be sure to define all variables appropriately.

2. (2A) Graph the system of inequalities that you stated in the previous problem.



3. (1A, 1D, 2B) State the system of inequalities that corresponds to the following graph.



4. (1D, 1E, 2C) Solve the inequality  $\frac{1}{4} < 2^x \leq 32$  for  $x$ . State the solution set in interval notation.

5. (R1C, 2C) Nathan is trying to determine the length of the hypotenuse of a right triangle using the Pythagorean Theorem. He is given that the lengths of the legs are 6 and 8. He reasons that, using the equation  $a^2 + b^2 = c^2$ , he can just take the square root of each term and use  $a + b = c$  instead. Thus, Nathan determines that the length of the hypotenuse must be 14. Is his reasoning correct? If so, explain thoroughly. If not, determine what the length of the hypotenuse should be.

For the next two problems, refer to the following information:

Mr. Buck has two siblings. Last year, Mr. Buck's sister was twice as old as Mr. Buck's brother. This year, the sum of the ages of Mr. Buck's siblings is 59.

6. (1A, 1B, 1C) State a system of equations that matches the given scenario. Be sure to define all variables appropriately.

7. (2D or 2E) Use your system to determine how old Mr. Buck's brother is this year.

You may choose to do either problem 8 or problem 9. You must do at least one of these problems; however, you need not do both (but you may if you wish).

8. (2E) Consider the following matrix:

$$\left( \begin{array}{cc|c} 2 & 5 & -1 \\ 3 & -7 & 4 \end{array} \right)$$

Use row operations to manipulate the matrix so that the entry in the upper-left corner is a 1 and the entry in the lower-left corner is a 0. (You need not solve the system completely; however, if you want to finish solving the system, you may.)

9. (C3, 2E) Explain in detail the general procedure for using matrices to solve a system of equations. (Assume that the system has exactly one solution.) Include a list of the valid row operations and a description of the format of the final matrix.

The following problem is a challenge problem. If you have time left over after completing the exam, give it your best shot. If you think you solved it and you want Mr. Buck to count it for credit, please indicate that fact. Good luck! ☺

10. (2C and 2D, optional) Solve the following system of equations:

$$\begin{cases} y &= 8 \cdot 3^x \\ y &= \frac{9}{2} \cdot 4^x \end{cases}$$